CLEAN TECHNOLOGY AND THE GREEN ECONOMY

Growing Products, Services, Businesses and Jobs in California's Value Network

DRAFT

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CALIFORNIA ECONOMIC STRATEGY PANEL

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PREFACE

The California Economic Strategy Panel (Panel) continuously examines changes in the state's economic base and industry sectors to develop a statewide vision and strategic initiatives to guide public policy decisions for economic growth and competitiveness (see www.labor.ca.gov/panel/). The fifteen-member Panel is comprised of eight appointees by the Governor, two appointees each by the President pro Tempore and the Speaker and one each by the Senate and Assembly Minority Floor Leaders. The Secretary of the California Labor & Workforce Development Agency serves as the Chair.

The Panel first identified California's economy as an economy of regions in 1996. At that time, the Panel also adopted a new way of looking at industry sectors and how they function and grow as industry clusters. These new ways of looking at the economy became the basis for the analytical work completed then, and have provided a foundation for the Panel's work since that time.

The California Regional Economies Project is currently the lead research mechanism for the Panel to identify economic policy issues and growing industry sectors. The project provides the state's economic and workforce development systems with data and information about changing regional economies and labor markets. The information provides a new resource in economic and workforce development strategic planning, policy development and investment decisions at the state and regional levels.

With the enactment of the California Global Warming Solutions Act (AB 32) as well as several Climate Action Team initiatives, California is becoming a national and global leader in combining advances in public policy and private sector innovation to enhance both environmental quality and economic growth. With the venture capital community heavily investing in a range of clean technologies, questions arise as to what makes up the green economy, what jobs are being created, and what economic policy issues need to be addressed. These investments signal a transformation for the entire California economy.

The Clean Technology and the Green Economy: Growing Products, Services, Businesses and Jobs in California's Value Network is another monograph in a series of studies produced under the California Regional Economies Project. The monograph's primary objective is to help define California's green economy and provide state government policy leaders with answers to the questions above. The California Economic Strategy Panel will engage the range of leaders contributing to this economic transformation and consider policy implications to facilitate growth and competitiveness of the emerging green economy.

The California Regional Economies Project is sponsored by the California Labor & Workforce Development Agency, California Employment Development Department, California Workforce Investment Board, California Community Colleges Chancellor's Office and Employment Training Panel.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Nationally and globally, attentions are focusing on rising energy costs, questions of national energy security, worry over environmental and related societal threats as well as fears of economic slow-down. These seemingly countervailing crises might suggest that a choice must be made between doing what is good for the environment *OR* doing what is good for the economy.

California's green economy demonstrates that this is not the case. California's green economy is not about a handful of new industries struggling in under-developed markets. Instead, it is about the potential of new technologies combined with innovative public policy and strategic investment to stimulate the growth of new markets for environmentally sound products and services while also reinvigorating slowing markets through the widening application of new technologies across the entire economy.

New discoveries and importantly new demand for green technologies are fueling the expansion of business activities across the entire economy to develop in greener ways, offer greener products, and provide services in helping businesses become more resource efficient. **As green products and practices permeate the reaches of the economy, the discussion is no longer about the emergence of a new industry; instead it is about the transformation of the entire economy. This transformation is toward an economy that makes more efficient and sustainable use of our limited natural resources.**

From an economic and workforce development standpoint, this bears significant meaning. While new technologies require new skills in the workforce, the economy-wide application of these technologies translates into growing job opportunities.

From a global competitiveness standpoint, many other countries have more developed green markets and have benefited from robust public investment in R&D. As our local demand for greener products grows, policymakers and business representatives working together can help ensure that California companies are filling local and global demand.

Central Findings:

- California's green industry is primarily in **energy generation** and **energy efficiency**.
- In energy generation, activities relating directly to **solar** make up **64 percent of establishments** and **53 percent of employment**.
- Although distributed across the state, the **Bay Area Region** and the **Southern California Region** are the major hubs of activity.
- **Green building** is more concentrated in the Bay Area Region.
- Energy storage and energy efficiency are more concentrated in the **Southern California Region**
- **Manufacturing accounts for 41 percent of employment** and 15 percent of establishments in California's green businesses.
- **Professional, Scientific & Technical Services accounts for 28 percent of employment** and 36 percent of green establishments.
- **Construction accounts for 10 percent of employment** and 19 percent of green establishments.

THE CONTEXT: New Constraints and New Options

Nationally and globally, attentions are focusing on rising energy costs, questions of national energy security, worry over environmental and related societal threats as well as fears of economic slow-down. These seemingly countervailing crises might suggest that a choice must be made between doing what is good for the environment *OR* doing what is good for the economy.

Closer examination of California's green economy belies this assumption. California's green economy is not about a handful of new industries struggling in under-developed markets. Instead, it is about the potential of new technologies combined with innovative public policy and strategic investment to stimulate the growth of new markets for environmentally sound products and services while also reinvigorating slowing markets through the widening application of new technologies across the entire economy.

For instance, investment in energy efficiency addresses all the above concerns. As energy costs continue to rise at record rates and businesses worry about economic slow-down, cost-savings through increased energy productivity provides a recession buffer, improves competitiveness, and stimulates the market for new and improved methods for energy conservation. Further, unlike the installation of renewable energy generation systems, the return on investment for energy efficiency technologies and practices is almost immediate and, thereby, allowing resources for other uses or investment.[1]

Further, numerous studies have determined that the growing green economy will also be generating significant job opportunities. According to a U.C. Berkeley report that reviewed 13 studies examining the impact of renewable energy on job creation, "The renewable energy sector generates more jobs per megawatt of power installed, per unit of energy produced, and per dollar of investment, than the fossil fuel-based energy sector."[2] Looking specifically at the impact of the California Global Warming Solutions Act (AB 32), the results of the macroeconomic analysis indicate that by 2020 the State would reap a $74 billion increase in GDP and would generate 89,000 new jobs.[3]

Evidence is emerging for the validity in these predictions, and it is becoming clear that this is a matter of maintaining California's global competitiveness and relevance where very strong competition from other countries already exists.[4] Specifically in the solar industry, the press is reporting on the unmet demand for skilled workers in general and the growing demand for manufacturing space in Silicon Valley, a hub for the solar industry.[5] Policymakers are responding with pending legislation for green job training programs at both the state and federal levels. The California Green Collar Jobs Act (AB 3018) would develop programs and strategies for assessing the needs of the State's growing green economy and provide green job training. Title X of the U.S. Energy Bill includes $125 million for the Green Jobs Program that would create an Energy Efficiency and Renewable Energy Worker Training Program for training in jobs such as solar panel manufacturer and green building construction worker.

So, what are the characteristics of California's green economy?

WHAT IS THE GREEN ECONOMY?

As Californians install solar systems on their roofs, municipalities buy zero-emission busses, and businesses examine their carbon footprints, tracking the development of California's green economy is more complex than a conventional industry analysis. Some producers of green technologies are more easily identifiable than others; however, most producers stem from the design and manufacture of conventional technologies and products. For instance, some of the largest producers of photovoltaic cells are semiconductor manufacturers.

New discoveries and importantly new demand for green technologies are fueling the expansion of business activities across the entire economy to develop in greener ways, offer greener products, and provide services in helping businesses (and residents) become more resource efficient. This reality means that more often than not, green products and practices are contained in the same industry categories as conventional products and practices and thus precludes an economic analysis based primarily on tracking business and employment growth by industry code.

Notably, as green products and practices permeate the reaches of the economy, the discussion is no longer about the emergence of a new industry; instead, it is about the transformation of the entire economy. This transformation is toward an economy that makes more efficient and sustainable use of our limited natural resources.

From an economic and workforce development standpoint, this difference is significant. While new technologies require new skills in the workforce, the economy-wide application of these technologies has potential to reinvigorate industries that were either not growing or even declining. For instance, the new interest in green building and solar installation has created new demand in construction activities in an industry that is experiencing a slow-down.[6] The application of solar technologies across a growing spectrum of consumer products and apparel is creating new niches in these markets.

In terms of California's role as a global leader in technology, in the fields of clean technology, the state is already up against stiff competition from abroad where governments are ahead of the U.S. in both encouraging the growth in clean technology markets and also investing strongly in research and development in their countries. Illustrating this, in its *Clean Tech Trends 2008*, Clean Edge reports that at the recent American Wind Energy Association convention, "most of the largest booths housed turbine manufacturers, component suppliers, and wind farm developers from China, Denmark, Germany, India, Japan, Portugal, Spain, Sweden, the U.K. and other countries."[7]

World-Wide Growth in Clean Technology Hits Record Highs

Venture capital investment in clean energy reached **$2.7 billion** in 2007 **up 70%** from the previous year.

Megawatts Growth 2003 to 2007:
- **Solar PV Installations +355%**
- **Wind Power +150**

Billions of Gallons 2003 to 2007
- **Biofuels +123%**

Clean Energy Trends 2008, Clean Edge, Inc.

California's Green Economy Value Network

California's green economy value network encompasses the activities along the entire length of a product's value chain. From R&D to investment, commercialization, distribution, installation and final usage, each stage requires specific products and services. As the demand for green technologies grows, the demand on the related networks of suppliers, distributors and service providers also grows creating a multiplier effect that ripples across the economy.

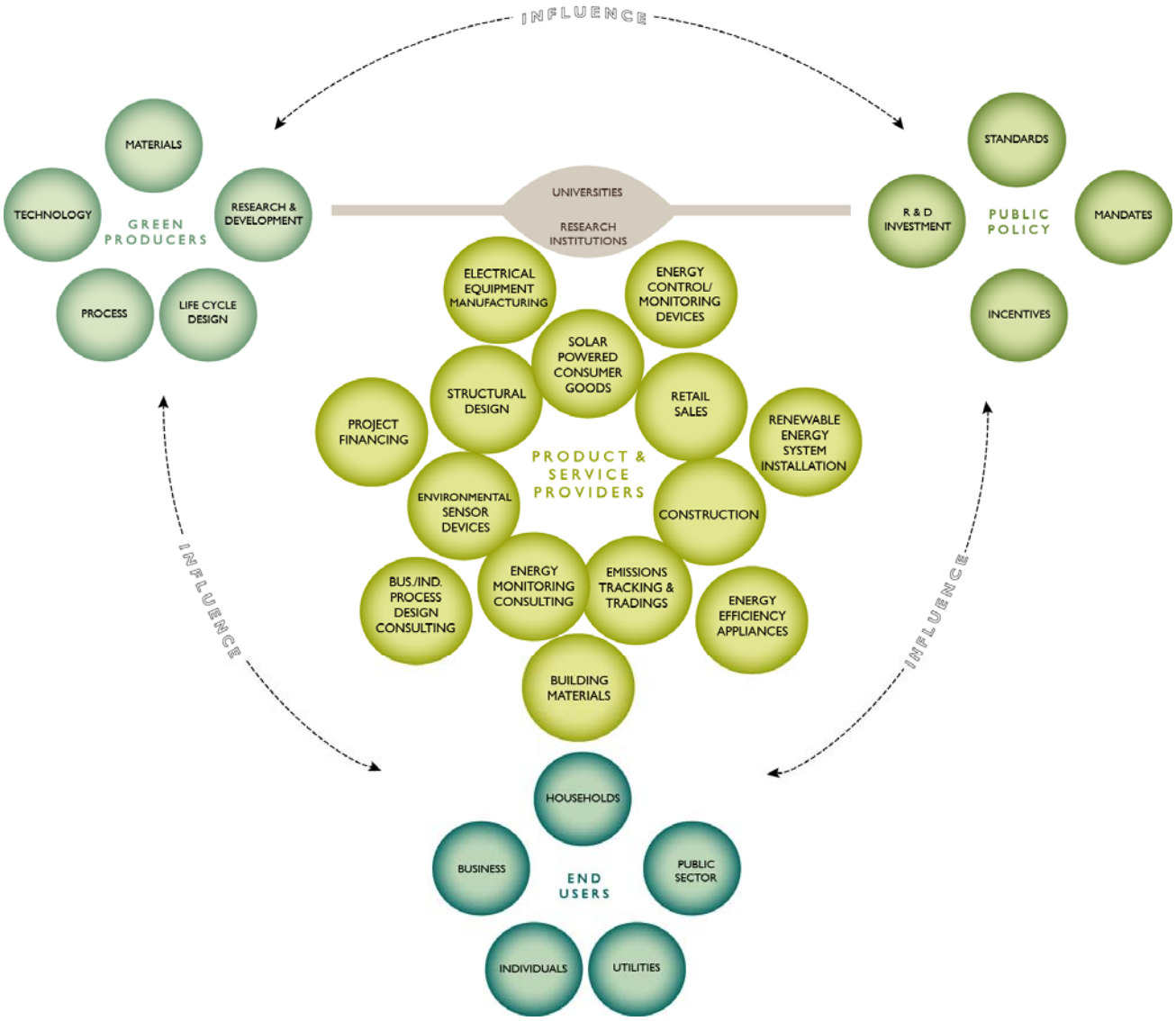
Core to California's green economy value network are the **producers of green technologies**. These include technologies that generate energy from renewable sources, store energy, conserve energy, monitor and regulate energy usage and the pollution it generates, and efficiently manage water and other natural resources.

Technological advancement relies on R&D, and the **public sector** can play a critical role by investing in R&D through universities and other research institutions. Also important in the development of new technologies are the industry standards the government defines and regulates. Examples of successful policy initiatives that have been replicated by other states and nationally are the energy efficiency standards for appliances (Title 20) and for buildings (Title 24). In the field of defining industry standards, a dialogue develops between green producers and policymakers as the actions of each influence the other.

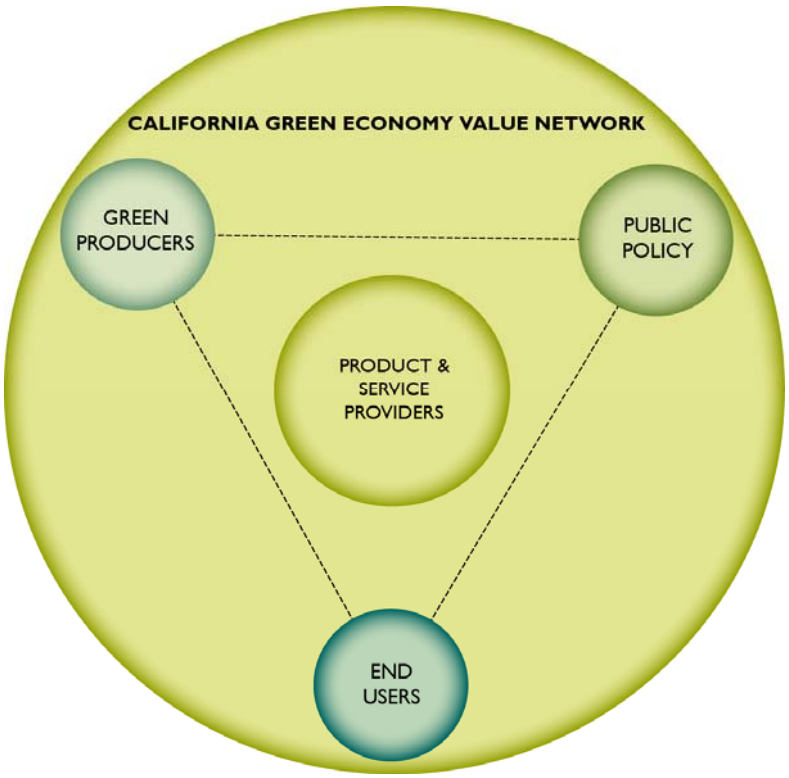
Likewise, **public policy** plays a critical role in encouraging the adoption of new technology which serves to jumpstart market demand and reduce entry costs. Public policy can encourage the adoption of new technologies by offering tax advantages and rebates to help lessen the early entry costs associated with new technology such as with the California Solar Initiative.[8] Also, the public sector can mandate the types of products and services purchased with public funding such as with vehicle purchases for the California State owned vehicle fleet.[9]

The **end users** of green technology are diverse. They include private households, businesses, public agencies, and utilities. While end users take advantage of public incentives, they also influence the public discourse concerning investment, standards, mandates and incentives. Similarly, the choices end users make influence decisions by green producers regarding product design and new applications. Additionally, as end users are becoming more conscious about the environmental impact of a product from production to disuse, consumers are demanding cleaner production processes and recycling services for the end of the product's life.

CALIFORNIA GREEN ECONOMY VALUE NETWORK



As the flows of actions and influence increase between the public sector, green producers and end users, demand for green technology and products increases and diversifies. Each product develops along its own value chain requiring its own set of **suppliers, distributors and service providers.** As products diversify, their value chain networks become more specialized creating new suppliers, distributors and service providers. This business activity fills the large space between the green technology producer, the public sector, and the end user. Additionally, as the technology advances, new applications emerge reinvigorating old markets and creating new as exemplified by construction and apparel as well as green taxis and solar car washes. This is the multiplying effect new technology can have on the economy. This growth of new and expanded business activity extends beyond the large central space of growing suppliers, distributors and service providers to encompass the entire economy. And expanding business opportunity means growing job opportunities. The next section illustrates the solar industry value chain network.



Example: The Solar Energy Value Network

As explained previously, public policy can have a significant role in technological advance by both investing in R&D efforts and incentivizing early adoption of new technology by alleviating some of the cost burden. These three points – public policy, solar R&D, project financing - help to frame the Solar Energy Value Network.

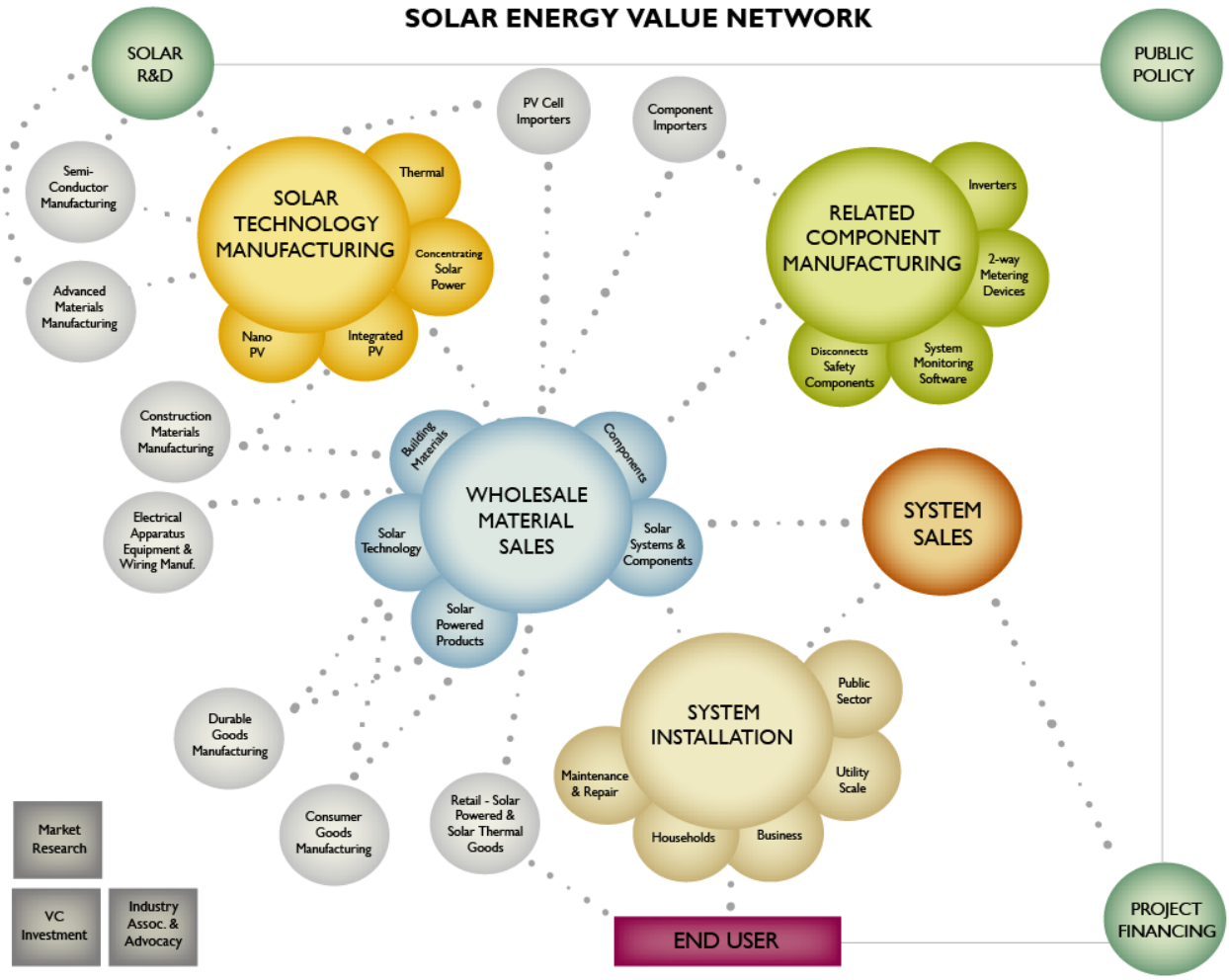
Technological innovation can have a wide-spread impact across the economy. For example, the economic impact of the application of solar energy technology goes well beyond the manufacture of photovoltaic cells. As the technology develops, new developmental branches emerge as solar research is influenced by other technological advances such as in nanotechnology.

Each new branch of solar technology advances presents opportunity for new applications and new products. And, each product has its own value chain requiring a different set of components. A complete energy generating system requires core components for the management and transmission of energy. These may or may not be exclusively "green" in character, but are growing in demand because of the growing solar market.

Manufacturers require component and materials suppliers as well as distributors of their own products. As solar technology manufacturing grows, distribution flows of supplies and products increase, and the realm of wholesale material/product sales related to solar expands. Not only are these wholesalers supplying retail sellers and installers of solar systems, they are also supplying solar technology to manufacturing industries such as construction materials, appliances, and other consumer goods.

Installation of a solar system is costly and state rebates and federal tax credits aim to help lessen this barrier to adoption. Businesses have sprung up to help small and large-scale consumers alike to best leverage these public incentives and find ways of financing the rest of the project.

The end users of solar technology are multifarious, and as the technology continues to develop in new ways, new applications will emerge. In addition to energy generating systems on roofs of homes and schools, new business models are appearing such as the case with the a solar car wash.



Completing the framework of R&D, Policy and Project Financing, of the Solar Energy Value Network are three other pieces that serve to speed the flows of activity described above. Venture capital investment encourages R&D and speeds the process of new technology to market. Market research feeds vital information back to the R&D and commercialization processes. Industry associations provide a networking space for businesses and individuals as well as a voice for influencing public policy in areas such as defining government regulated standards and designing public incentives for technology adoption. In each area, specialized business activities are developing with a focus on the solar energy market. In addition to multiple solar industry associations, marketing firms as well as venture capital firms are appearing with a single focus on the solar energy market.

INVENTORY OF CALIFORNIA'S GREEN INDUSTRY FIRMS: How Large is the Industry?

Establishing a clear accounting of the growing number of businesses with primary activities in providing environmentally sustainable products and services is challenging. Exactly what types of businesses are meant when referring to this new and growing industry can vary widely.

What is a "Green" Business?

The scope of businesses examined for this study is based roughly on the definition of Cleantech established by the Cleantech Group, LLC™. Cleantech is new technology that spans a broad range of products, services and processes that lower performance costs, reduce or eliminate negative ecological impact, and improve the productive and responsible use of natural resources.[10]

In addition to new technology firms, this analysis aims to capture other related business activities that either support the wide-spread application of new technologies such as solar system installations or apply new technologies as service providers for instance in emissions monitoring. In addition, specialized business services are developing with a focus on serving the particular needs of green businesses. Complicating the categorization, the activities of a business often blur across categories.

Typically, industry analyses examine a sample of business establishments defined by a select set of industry codes such as the North American Industry Classification System (NAICS). For indentifying green businesses; however, these codes do not provide sufficient detail.

GREEN INDUSTRY SEGMENTS adapted from Cleantech™ *
Energy Generation
Energy Efficiency
Transportation
Green Building
Energy Storage
Environmental Consulting
Water & Wastewater
Finance/Investment
Environmental Remediation
Air & Environment
Business Services
Research & Alliances
Agriculture
Recycling & Waste
Materials
Manufacturing/Industrial
*See Appendix for Cleantech™ definition

Analytical Approach

The research presented is based on a combination of business search through green business associations and other resources as well as data mining the National Establishment Time Series (NETS) database which is based on Dun & Bradstreet data. This data provides establishment-level information, including sole-proprietorships, as well as a relatively detailed industry classification system that while based on Standard Industrial Classification (SIC) system (the predecessor of NAICS), extends the original 4-digit codes to eight digits allowing far greater detail than NAICS. (Please see Appendix for tables comparing establishment and employment in NETS with Quarterly Census of Employment and Wages, QCEW).

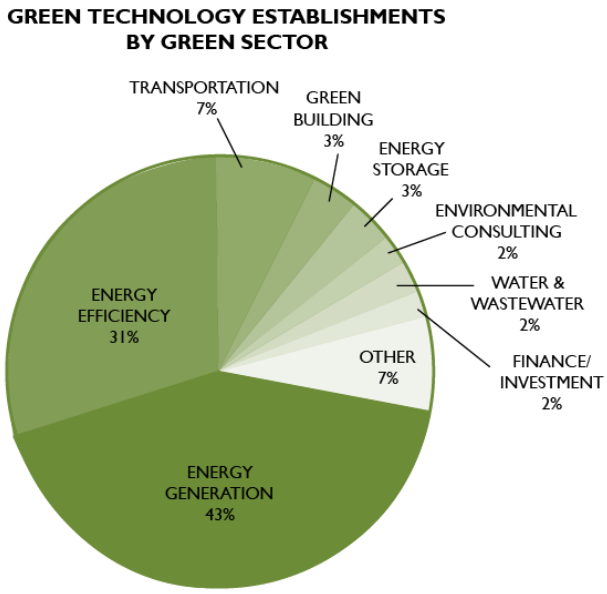
While the results presented here cannot claim to account for every single firm working in green technology or related activities, this analysis does provide a first step in assessing the scope of activities in the green economy. Further work will refine the categorization of firms and expand the database through continued research and data mining.

Composition of California's Green Business

In this section we look at the distribution of California's green establishments by green segment (described above), by industry sector and, for the sectors accounting for the largest employment shares, by detailed industry (6-digit NAICS).[11] Finally, occupations related to these industries are highlighted.

By Green Segment:

By green segment, California's green businesses are primarily in energy generation and energy efficiency. In terms of distribution across the state by CREP Region,[12] the Bay Area Region and the Southern California Region are the two major hubs of activity with only modest variation in green sector mix.



Energy generation represents the largest segment of California's green businesses. These include businesses with primary activities in manufacturing, design, installation, system management, consulting and various business services and associations focused on energy generation or specific forms such as solar or wind. The 64 percent of these businesses and 53 percent of employment relates specifically to solar energy generation.

Energy efficiency makes up 31 percent of green business. Forty percent of thes firms are in energy conservation consulting; however, the bulk of employment is in the manufacturing, design and sales of low-wattage or zero-wattage lighting products.

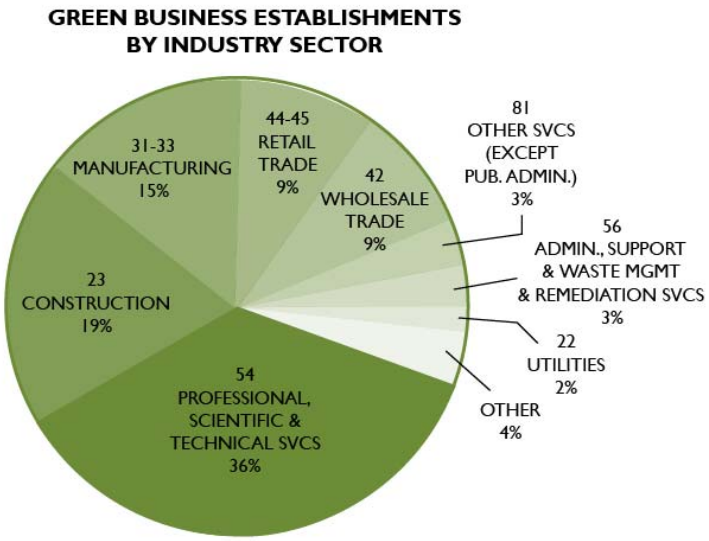
Seven percent of green businesses are in **transportation.** Forty-eight percent are focused on alternative fuels which represents 33 percent of employment in that sector. The main activities of one-third of these businesses is related electric vehicles, many of which are recreational vehicles.

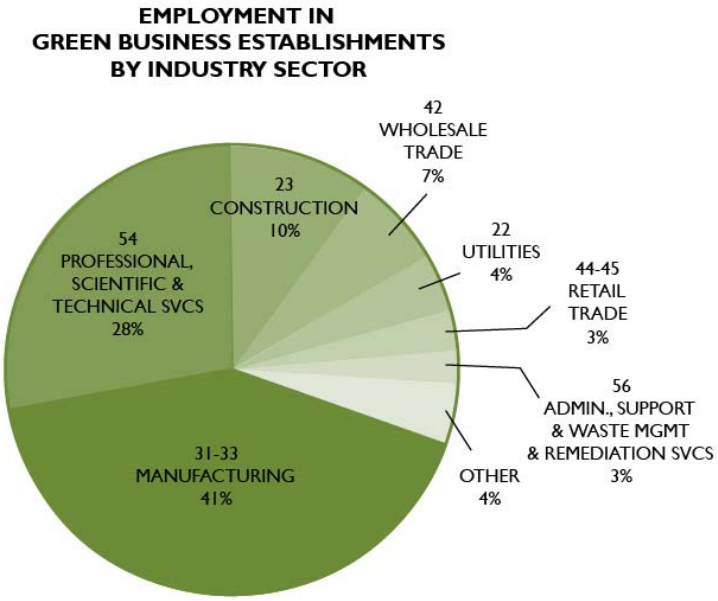
Green building and **energy storage** each accounts for 3 percent of green firms. While two-thirds of which are in design and/or construction, 21 percent are focused on the manufacture and sales of green building materials. The activities of the vast majority **energy storage** firms are in the design, manufacturing, and distribution of various battery technologies.

Environmental consulting, **water & wastewater**, and **finance & investment** each accounts for 2 percent of the state's green businesses. Environmental consulting firms help other firms assess, manage and monitor their environmental impact and sometimes their related public relations as well. This segment includes research and testing services. Water & wastewater firms are specialized in the design and manufacture of water purification products and consulting services. They also include water management services. Finance & investment includes businesses providing project financing specifically for large and small-scale renewable energy projects. Also included in this group are venture capital and private equity firms specializing in clean technology ventures.

By Industry Sector:

How are California's green establishments and employment distributed across the economy based on the North American Industry Classification System (NAICS)? Reflecting the breadth of activities in the green economy, California's green business establishments span the realms of high-tech and scientific services to construction and manufacturing. Thirty-six percent of California's green business establishments are in Professional, Scientific & Technical Services, 19 percent are in Construction, and 15 percent are in Manufacturing. Together, Wholesale and Retail account for 18 percent.





Running counter to general economic trends, the largest portion of green business employment is in manufacturing. The bulk of employment in California's green businesses is in Manufacturing (41%) and Professional, Scientific & Technical Services (28%). Both sectors boast jobs with relatively good earnings. Median annual earnings currently reported for these two sectors are $35,725 and $56,754 respectively.[13]

Green business activities are taking place across the entire economy; however, how much of the economy do they represent at this time? The sample of currently active green businesses that is at the core of this analysis is by no means a comprehensive representation of all green business in California. Nonetheless, it is the most comprehensive attempt to this date at establishing an accounting of this expanding realm of business growth in the State.

As described above, most green establishments are in Professional, Scientific & Technical Services (1,112), Construction (582), and Manufacturing (454). In each of these three sectors, these green establishments account for one half percent of all California establishments. For comparison, California's business establishments in software represent 1.8 percent of all establishments. Green establishments in Utilities (61) make up the largest sector share with 2.8 percent.

California GREEN Establishments and Employment

NETS Analysis

	INDUSTRY SECTOR	ESTABLISHMENTS				EMPLOYMENT			
		GREEN ESTAB*	% SECTOR	CA TOTAL**	% TOTAL CA	GREEN EMP*	% SECTOR	CA TOTAL**	% TOTAL CA
31-33	Manufacturing	**454**	**0.50%**	90,874	6%	**18,086**	**1.2%**	1,505,182	12.5%
54	Professional, Scientific, and Technical Services	**1,112**	**0.53%**	208,553	14%	**12,226**	**1.4%**	864,551	7.2%
23	Construction	**582**	**0.51%**	113,405	7%	**4,476**	**0.6%**	769,593	6.4%
42	Wholesale Trade	**275**	**0.31%**	89,765	6%	**2,935**	**0.4%**	833,756	6.9%
22	Utilities	**61**	**2.81%**	2,190	0%	**1,796**	**2.3%**	78,073	0.6%
44-45	Retail Trade	**290**	**0.14%**	204,202	13%	**1,139**	**0.1%**	1,617,769	13.5%
56	Administrative and Support and Waste Management and Remediation Services	**86**	**0.08%**	110,243	7%	**1,137**	**0.2%**	495,254	4.1%
81	Other Services (except Public Administration)	**105**	**0.06%**	177,313	12%	**641**	**0.1%**	549,256	4.6%
48-49	Transportation and Warehousing	**16**	**0.05%**	32,657	2%	**422**	**0.1%**	490,510	4.1%
52	Finance and Insurance	**44**	**0.06%**	80,237	5%	**346**	**0.1%**	480,048	4.0%
51	Information	**11**	**0.03%**	43,422	3%	**220**	**0.1%**	380,536	3.2%
71	Arts, Entertainment, and Recreation	**21**	**0.06%**	34,930	2%	**91**	**0.0%**	201,149	1.7%
99	Unclassified	**6**	**0.02%**	2,176	0%	**88**	**0.9%**	9,760	0.1%
53	Real Estate and Rental and Leasing	**12**	**0.01%**	81,466	5%	**86**	**0.0%**	299,318	2.5%
55	Management of Companies and Enterprises	**2**	**0.12%**	1,936	0%	**31**	**0.2%**	12,545	0.1%
21	Mining	**4**	**0.25%**	1,497	0%	**23**	**0.1%**	24,589	0.2%
62	Health Care and Social Assistance	**4**	**0.00%**	128,652	8%	**4**	**0.0%**	997,522	8.3%
11	Agriculture, Forestry, Fishing and Hunting			22,462	1%		**0.0%**	208,833	1.7%
61	Educational Services		**0.00%**	28,207	2%		**0.0%**	680,305	5.7%
72	Accommodation and Food Services		**0.00%**	61,352	4%		**0.0%**	668,825	5.6%
92	Public Administration			8,960	1%		**0.0%**	849,012	7.1%
		3,085	**0.20%**	**1,524,499**		**43,746**	**0.4%**	**12,016,386**	

*Distribution of establishments across sectors was imputed for 1,611 establishments for which the Green Segment was known.

**California totals represented here are from the NETS database which differs from the official employment and establishment estimates published by the State of California.

NOTE: It should be noted that this analysis does not include all government employment that could be considered a "green" job.

Manufacturing is the industry sector with the largest share of green employment. A more detailed view reveals that California is host to manufacturing jobs that relate to all green segments. Associated directly with solar, 18 percent of employment in green manufacturing is in semiconductor and related device manufacturing. Various forms of instrument and device manufacturing, lighting, heating system, battery and turbine manufacturing are some of the top employers.

In professional, scientific and technical services, energy conservation consultants account for 38 percent.[14] Following these are engineering services and research and development with 19 percent and 15 percent of employment in that sector respectively. Employment in this sector also reflects marketing activities specialized in green business.

Not surprisingly, over half of employment in construction is in plumbing, heating and air conditioning contractors. Among other things, these are the installers of energy efficient furnaces as well as solar systems. Electrical contractors make up 29 percent of green construction employment as the electrical infrastructure is vital to most all green segments.

Supplying the three sectors described above is wholesale trade, and 30 percent of employment in this sector relating to green business is electronic parts and equipment which includes semiconductor devices and communication equipment.[15]

DISTRIBUTION OF GREEN ESTABLISHMENTS & EMPLOYMENT BY DETAILED INDUSTRY CODE

ACCOUNTING FOR 2% OR MORE OF EMPLOYMENT BY SECTOR

NAICS		Establish-ments	Employ-ment
31-33	**MANUFACTURING**	**100%**	**100%**
334413	Semiconductor and Related Device Manufacturing	12%	18%
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	7%	11%
335121	Residential Electric Lighting Fixture Manufacturing	0%	10%
335122	Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing	4%	7%
335911	Storage Battery Manufacturing	3%	6%
333414	Heating Equipment (except Warm Air Furnaces) Manufacturing	12%	5%
333319	Other Commercial and Service Industry Machinery Manufacturing	4%	5%
334512	Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use	5%	4%
333611	Turbine and Turbine Generator Set Unit Manufacturing	2%	3%
326199	All Other Plastics Product Manufacturing	1%	2%
334519	Other Measuring and Controlling Device Manufacturing	3%	2%
54	**PROFESSIONAL SCIENTIFIC, AND TECHNICAL SERVICES**	**100%**	**100%**
541690	Other Scientific and Technical Consulting Services	56%	38%
541330	Engineering Services	14%	19%
541710	Research and Development in the Physical, Engineering, and Life Sciences	13%	15%
541910	Marketing Research and Public Opinion Polling	0%	4%
541310	Architectural Services	1%	3%
541380	Testing Laboratories	0%	3%
541618	Other Management Consulting Services	4%	2%
541613	Marketing Consulting Services	1%	2%
541720	Research and Development in the Social Sciences and Humanities	1%	2%
23	**CONSTRUCTION**	**100%**	**100%**
238220	Plumbing, Heating, and Air-Conditioning Contractors	55%	53%
238210	Electrical Contractors	28%	29%
238290	Other Building Equipment Contractors	3%	8%
236116	New Multifamily Housing Construction (except Operative Builders)	0%	3%
42	**WHOLESALE TRADE**	**100%**	**100%**
423690	Other Electronic Parts and Equipment Merchant Wholesalers	13%	30%
423720	Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers	34%	16%
423120	Motor Vehicle Supplies and New Parts Wholesalers	3%	15%
423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	19%	14%
423830	Industrial Machinery and Equipment Merchant Wholesalers	7%	6%
424710	Petroleum Bulk Stations and Terminals	5%	4%
423510	Metal Service Centers and Other Metal Merchant Wholesalers	2%	3%
423430	Computer and Computer Peripheral Equipment and Software Merchant Wholesalers	1%	3%
423840	Industrial Supplies Merchant Wholesalers	2%	2%

Occupations in Green Industries

As observed on the previous page, the bulk of green industry employment is in manufacturing and professional & scientific services, and the occupations associated with these industries span a wide spectrum of skills and earnings levels. In addition to the full range of business support and management roles, occupations include high-level information technology engineers, skilled craftsmen, specialized technicians, manufacturing positions, and logistics personnel. This suggests that continued growth in green industries will create growing job opportunities for people from many very different educational backgrounds.

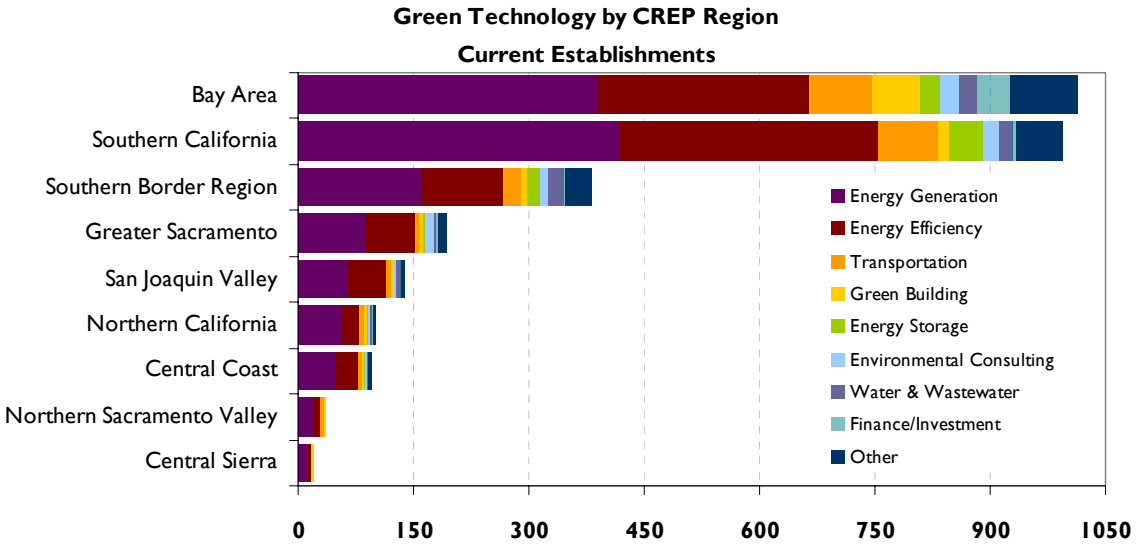
Example Occupations in California's Green Industry

Occupational Title	Median Annual Earnings	Percentage of All Jobs in Green Industry
Carpenters	$46,307	2.5%
Construction Laborers	$33,096	1.9%
Computer Software Engineers, Applications	$88,084	1.4%
Truck Drivers, Heavy and Tractor-Trailer	$36,612	1.4%
Team Assemblers	$23,255	1.2%
Maintenance and Repair Workers, General	$38,423	1.2%
First-Line Sup/Mgrs of Construction Trades and Extraction Workers	$61,995	1.0%
Electricians	$52,859	1.0%
Plumbers, Pipefitters, and Steamfitters	$47,439	0.9%
Business Operations Specialists, All Other	$61,396	0.8%
Computer Software Engineers, Systems Software	$92,542	0.7%
First-Line Supervisors/Managers of Production and Operating Workers	$52,072	0.7%
Management Analysts	$73,816	0.6%
Sales Rep, Wholesale and Manuf, Technical and Scientific Products	$66,371	0.6%
Inspectors, Testers, Sorters, Samplers, and Weighers	$32,041	0.6%
First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	$60,579	0.5%

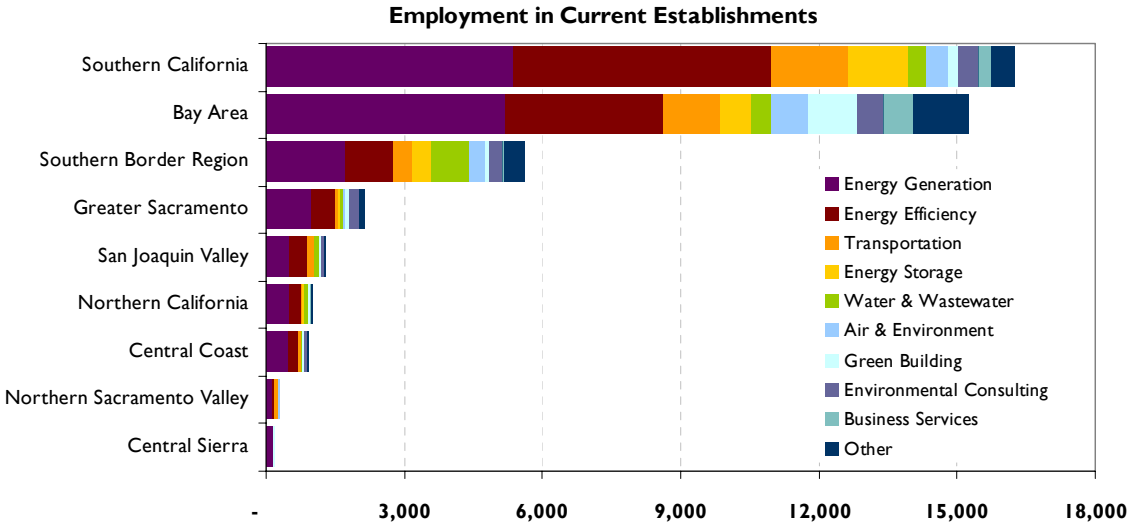
Geographical Distribution of the Green Economy

In looking at the distribution of California's green establishments by CREP Region,[16] although concentrated in the Bay Area Region and Southern California Region, California's green firms are located throughout the state. Business activities in energy generation and energy efficiency are taking place in all regions, but some patterns of regional specialization do emerge. Between the two major regions, green building and finance/investment make up larger shares of green businesses in the Bay Area Region while energy efficiency and energy storage are more numerous in the Southern California Region. Transportation is equally distributed across the two regions with some activity also taking place in the Southern Border Region.

In terms of the regional concentration of activities relative to the state as a whole, the Southern Border Region reflects a higher concentration of businesses in water and wastewater. Environmental consulting appears more concentrated in the Greater Sacramento Region.



Other includes all other segments representing less than 2% of establishments.



Other includes all other segments representing less than 2% of employment.

A PROMISING ENVIRONMENT FOR CALIFORNIA'S GREEN ECONOMY

Innovation is key to the continued success of California's growing green industry. A viable environment for continued innovation also requires innovative public policy that is forward-thinking, collaborative with the private sector, and globally oriented.

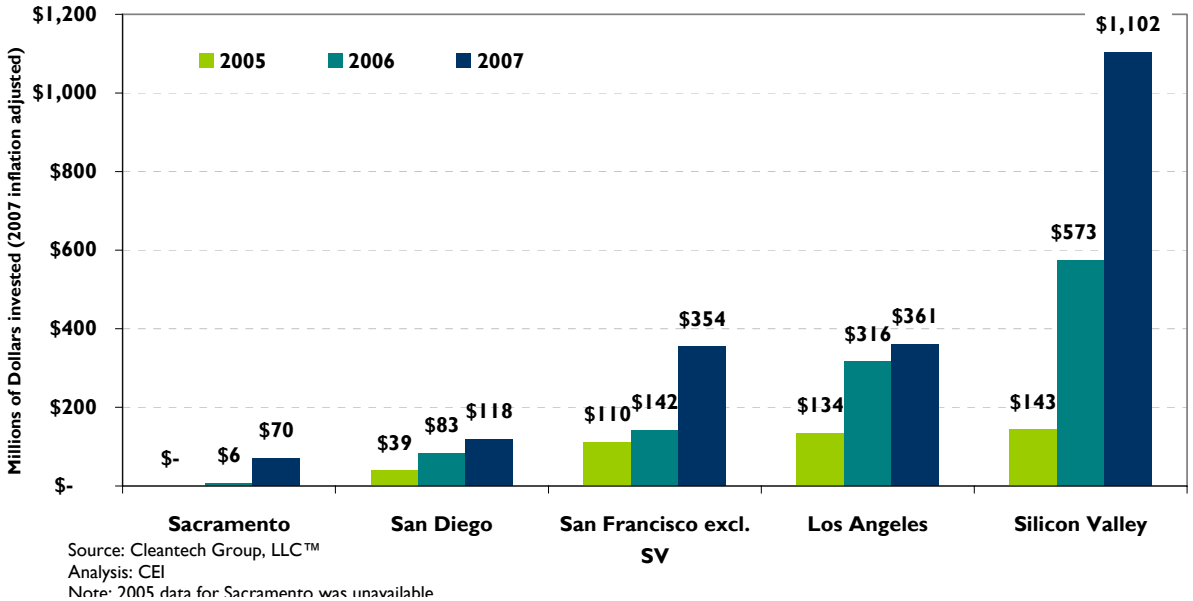
Green Innovation & Entrepreneurship

Venture capital (VC) investment is the leading indicator of innovation and economic growth. Venture capitalists invest in innovative, entrepreneurial firms that demonstrate potential for significant growth. As reported by the Cleantech Group, LLC™, investment in Cleantech[17] in California is on the rise.

From 2005 to 2007, total Cleantech VC investments in the state grew from $475 million to roughly $1.8 billion. In 2007, California attracted 276 percent more Cleantech VC dollars than two years before. Pulling in $960 million, energy generation is the technology segment that drew the greatest share of Cleantech VC investment, followed by transportation ($308 million) and energy efficiency ($108 million). The transportation technology segment had the highest percentage increase in VC investment, with an increase of 1,218 percent.

California Venture Capital Investment in Clean Technology	Millions of 2007 Inflation Adjusted Dollars		
Technology Segment	2005	2007	% Change 2005-2007
Energy Generation	$ 109	$ 960	+783%
Transportation	$ 23	$ 308	+1218%
Energy Efficiency	$ 15	$ 108	+608%
Energy Storage	$ -	$ 89	
Materials	$ 90	$ 80	-11%
Energy Infrastructure	$ 74	$ 65	-13%
Recycling & Waste	$ -	$ 63	
Agriculture	$ 42	$ 62	+48%
Water & Wastewater	$ 15	$ 31	+103%
Manufacturing/Industrial	$ 35	$ 13	-62%
Air & Environment	$ 71	$ 6	-92%
Total	$475	$ 1,785	+276%

Venture Capital Investment in Clean Technology
by California Region
Millions of 2007 Dollars
2005 - 2007



Source: Cleantech Group, LLC™
Analysis: CEI
Note: 2005 data for Sacramento was unavailable

VC investment in recycling & waste and energy storage is growing. Although neither of the two sectors attracted any VC dollars in 2005, by 2007, $63 million was invested in recycling & waste technologies and $108 million in energy storage.

Throughout California, all regions are drawing increasing amounts of Cleantech VC investments. It should be noted that the Cleantech Group, LLC™ uses its own regional definitions for the state, therefore these results are not reported by CREP Region. Within the state, Silicon Valley is California's top recipient of VC investments in Cleantech, attracting $1.1 billion in 2007. The second largest share of Cleantech VC went to companies in the Los Angeles region, amounting to $361 million in 2007. With $354 million, the San Francisco region (excluding Silicon Valley) also displays heavy and growing investment activity; in 2007, the region received 220 percent more Cleantech VC dollars than in 2005.

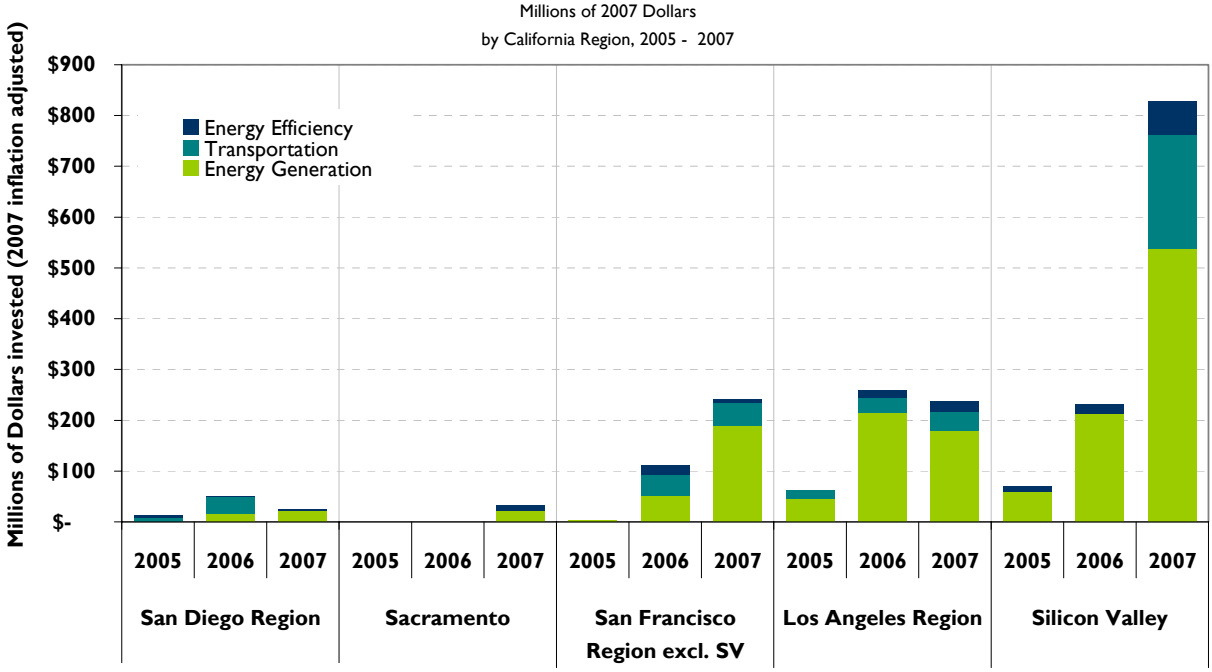
Although the highest concentration of Cleantech VC across the state remains in energy generation technologies, investment in transportation technology is making gains in some regions. For example, energy efficiency investments in the Los Angeles region declined by 17 percent from 2006 to 2007 while investment in transportation grew by 36 percent. Transportation is also emerging as a key investment area in Silicon Valley attracting $225 million in 2007.

Venture Capital Investment in Clean Technology

Top Three Cleantech Segments: Energy Generation, Transportation and Energy Efficiency

Millions of 2007 Dollars

by California Region, 2005 - 2007



Source: Cleantech Group, LLC™; Analysis: CEI

Note: 2005 data for Sacramento was unavailable.

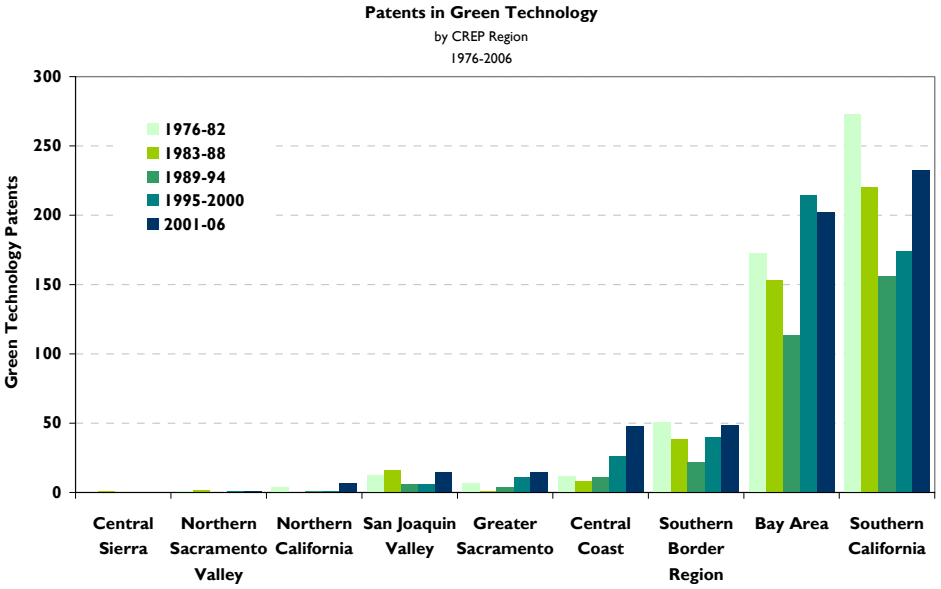
Green technology patent activity in California has been growing across the State since 1989, and in 2006 achieved a record number 109 total green technology patents registered. These patents include registrations in solar, and wind energy generation, energy storage, fuel cells and hybrid systems. Tracking patent registration activity is an indicator for R&D efforts, innovation generation, and commercialization potential.

By region, the highest concentration of green patent registrations is in the Southern California Region and the Bay Area Region. During 2001-2006, the Southern California Region had 59 more patent registrations in green technology areas compared to the earlier period while the Bay Area Region saw a slight drop, with thirteen fewer registrations.

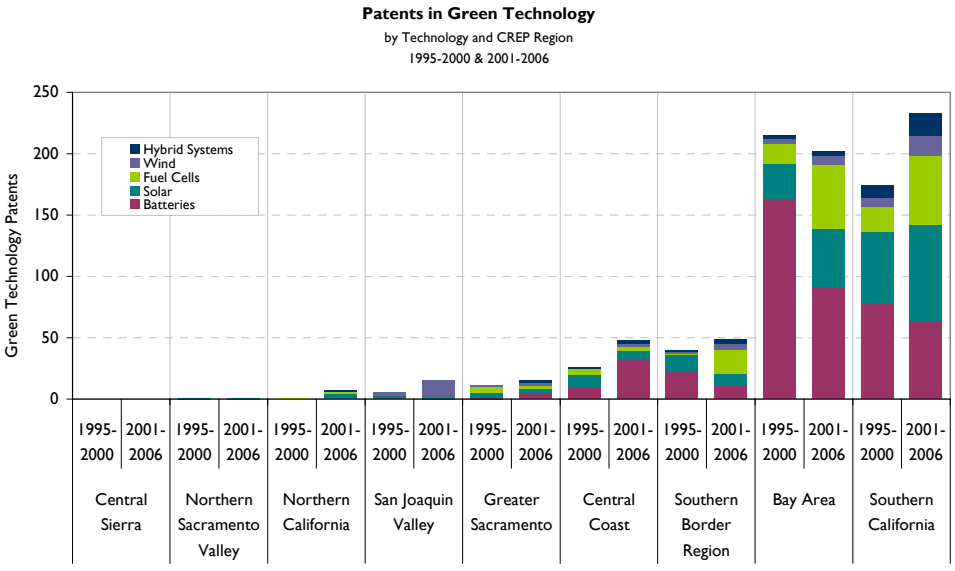
While patenting activity in the Bay Area Region is mainly in battery technology, fuel cells and solar, the Southern California Region displays significant specialization in all five green technology areas. The Southern Border Region exhibits specialization in fuel cell technology, and the Central Coast Region shows concentration in the battery technologies.

Patent activity in the two areas of solar technology and fuel cells is increasing particularly in the Southern California Region and the Bay Area Region.

The San Joaquin Valley Region saw a large increase in patent registrations related to wind technology over the two periods suggesting a regional clustering.



Data Source: 1790 Analytics; U.S. Patent & Trade Office; Analysis: CEI



Data Source: 1790 Analytics; U.S. Patent & Trade Office; Analysis: CEI

Innovative Public Policy: New Technology – New Markets

Since the 1970s, California has been at the forefront of implementing innovative public policy that serves to protect natural resources while also stimulating new markets. These include energy performance standards, consumer incentives, public procurement mandates, and public investment in R&D of new green technologies.

Standards

Energy performance standards enacted by California have been replicated by other states and the federal government, in particular, in setting standards for the energy efficiency of buildings and appliances. The Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24) were established in 1978 in response to a legislative mandate to reduce California's energy consumption. Periodically updated to allow for new energy efficiency technologies and methods, these standards include minimum requirements for building insulation as well as heating, ventilating, air conditioning, and water heating equipment. In 1980, the California Energy Commission was granted the right to adopt efficiency standards for appliances (Title 20). These standards, under the California Code of Regulations, cover refrigerators, freezers, washing machines, air conditioners and lighting.

In an effort to counteract the effects of climate change, the California Global Warming Solutions Act (AB 32) was signed into law by Governor Schwarzenegger in 2006. This major climate change initiative requires California to reduce its greenhouse gas (GHG) emissions to 1990 levels by 2020. By mandating the first ever statewide cap on global warming pollution, AB32 has put California at the forefront of the fight against global warming.

California's Renewable Portfolio Standard (RPS) was established in 2002 to ensure that a larger share of energy that is procured in California is from renewable sources. As one of the most ambitious renewable energy standards in the country, 20 percent of energy generation from investor-owned utilities (IOUs) is required to be renewable by 2010.

In another innovative policy effort, the Clean Car Law (AB 1493) passed in 2002 aims to regulate greenhouse gas emissions of cars; however, final enactment of the legislation has been contested by the auto industry and recently blocked by the U.S. Environmental Protection Agency. Although still pending litigation, 15 other states have either enacted or are in the process of enacting similar legislation.

Incentives

California has launched numerous incentive programs to support the adoption of new, clean technologies such as solar installation, alternative fuel vehicles, and energy efficiency upgrades to buildings.

Enacted in 2007, the California Solar Initiative aims to create 3,000 megawatts of new solar-produced electricity by 2017. With a $3.3 billion budget, the California Solar Initiative is the largest solar incentive program in the country. The decade-long program consists of three components:

- Incentives for solar installation in existing residential homes, and existing and new commercial, industrial, and agricultural properties. The program is funded through revenues and collected from electric utility distribution rates.
- Incentives for solar installation in new home construction through its New Solar Homes Partnership.
- Local publicly-owned electric utilities will adopt, implement, and finance a solar initiative program by January 2008.

The *Fueling Alternatives* vehicle rebate program provides rebates of up to $5,000 toward purchases or leases of eligible zero emission vehicles (ZEVs), plug in hybrid electric vehicles (PHEVs) and alternative fuel vehicles (AFVs) between May 24, 2007 and March 31, 2009.

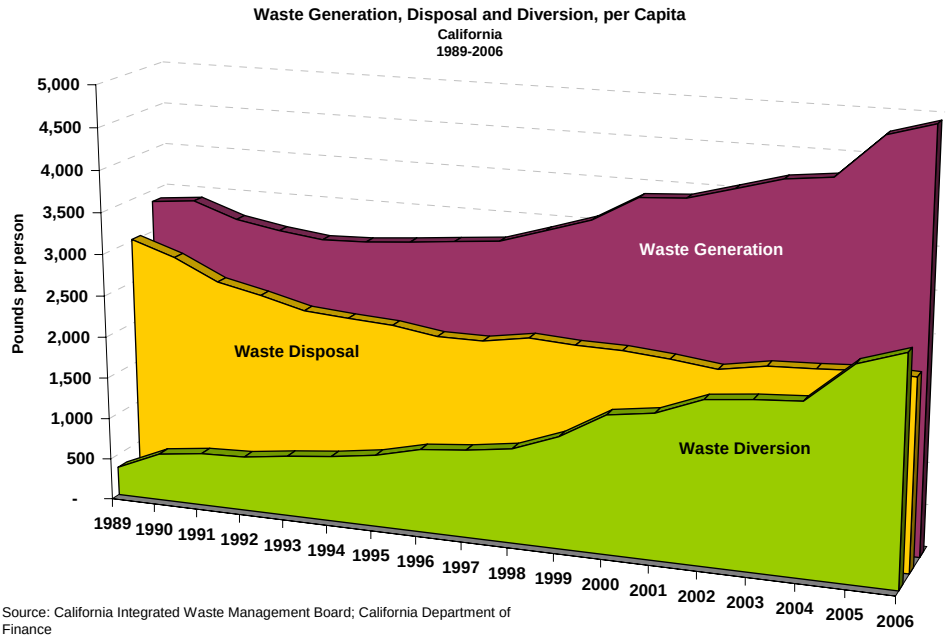
With the purpose of encouraging residents to replace old, wasteful home appliances, California offers a tax deduction for the interest paid on loans used for the purchase of energy efficient products or equipment for residences in California.

Mandates

The Green Building Initiative (Executive Order S-20-04) and the accompanying Green Building Action Plan calls for public buildings to be 20 percent more energy efficient by 2015 and encourages the private sector to do the same. The Green Action Team will help implement sustainable building practices and energy efficiency efforts statewide.

In 1989, the Integrated Waste Management Act (AB 939) was passed in California, requiring a statewide solid waste diversion rate of 25 percent by 1995 and 50 percent by 2000. Since AB 939 was established, diversion in California has increased ten-fold, reaching a 54 percent statewide waste diversion rate in 2006.

California Waste Diversion Rate (% of generation)	
1989	10%
1990	17%
1991	20%
1992	21%
1993	24%
1994	25%
1995	28%
1996	31%
1997	32%
1998	33%
1999	37%
2000	42%
2001	44%
2002	48%
2003	47%
2004	48%
2005	52%
2006	54%



Source: California Integrated Waste Management Board; California Department of Finance

R&D Investment

The enactment of the Global Warming Solutions Act (AB 32) requires reductions in carbon emissions that will likely only be achievable through the development and implementation of new technologies. The California State government and private industry have begun to recognize the critical need for supporting energy R&D. As Nathan Rosenberg of Stanford points out in *Inside the Black Box: Technology and Economics:*

> In addition to nourishing the supply side in a broad range of areas, intelligent policies must be directed at the institutional aspects of innovation processes, working to encourage the interaction of users and producers as well as the iterative interactions between basic and applied enterprises.[18]

In this regard, there is a unique bridging role that California state R&D funds have begun to play in the innovation system. While federal R&D (especially funding for universities) provides support for fundamental research, and industry R&D is focused primarily on commercialization and product development, state R&D funds can provide support for the essential "bridging" function; this covers the gap between the two by creating an environment for translating ideas into commercial products and processes. This open innovation model has been emerging in California, with involvement from government, private industry, and university entities reinforcing each other to create a unique R&D infrastructure. Some examples of public-private partnerships are:

> The Energy Biosciences Institute (EBI), established by BP in January 2007, is a research program that will explore how bioscience can be used to increase energy production and reduce the impact of energy consumption on the environment. The University of California at Berkeley, in partnership with the University of Illinois Urbana-Champaign (UIUC) and Lawrence Berkeley National Laboratory, will receive $500 million from BP to host a research center dedicated to developing biofuel technologies. EBI will conduct both basic and applied biological research relevant to energy, and will initially focus on developing renewable fuels for automobiles.
>
> UC Berkeley was one of five universities around the world invited to apply when BP announced that the company would dedicate $500 million over the next 10 years to a biofuels research facility. To improve the bid from the California universities, Governor Arnold Schwarzenegger's proposed budget for fiscal year 2008 includes $40 million in lease revenue to support the research center if a California institution won. The State also plans to contribute $70 million to build a headquarters for the institute.
>
> The Helios Project is an initiative of the University of California's Lawrence Berkeley National Laboratory to create sustainable, carbon-neutral sources of energy for which Governor Schwarzenegger dedicated $30 million in lease revenue bonds In December 2006. The main objective of the Helios Project is to produce the next generation of super-efficient solar energy technology for the purpose of reducing greenhouse gases and our oil dependency.

International Cooperation

California is collaborating with governments and companies from other countries to work toward mitigating the effects of climate change. The enactment of the California Global Warming Solutions Act in 2006 (AB 32) has stimulated even stronger global political and technological cooperation to reduce greenhouse gas emissions. These efforts take the form of international partnerships and accords as well as less formal collaborations. In 2006, California signed an accord with the United Kingdom, which focuses on carbon trading and promoting clean fuel technologies. California has recently developed partnerships with multiple Canadian provinces to collaborate on climate change action. In 2007, California formed a coalition with other US States, Canadian provinces, and the European Union to establish a global cap & trade carbon market. In addition, California's state pension fund leaders are teaming with international business leaders in a climate change campaign that calls for mandatory curbs on greenhouse gas emissions.[19]

Date	CA-Global Cooperation	Policy/ Initiative/ Organization
October 2007	Silicon Valley start-up company & Israel & Renault-Nissan	An initiative between the Israeli government, Renault-Nissan, and Project Better Place, a Silicon Valley start-up company, to install the world's first electric car network in Israel by 2011. The project includes a plan to develop 500,000 recharging stations throughout the nation.
December 2007	International business leaders and CalPERS, CalSTRS	Officials at CalPERS and CalSTRS have aligned themselves with some of the world's largest companies in a British-based petition drive calling for diplomats to fight climate change.
October 2007	A coalition of European Union Countries, U.S. States & Canadian provinces	The International Carbon Action Partnership (ICAP) was created to establish a global cap & trade carbon market.
August 2007	A coalition of states and territories in the U.S. and Canada: Arizona, California, New Mexico, Oregon and Washington, Utah, Manitoba and British Columbia	The Western Climate Initiative (WCI) is a regional collaboration aiming to dramatically reduce greenhouse gas emissions.
May 2007	California & British Columbia, Canada	Memorandum of Understanding between British Columbia and California for collaboration on climate change action.
May 2007	California & Ontario, Canada	Memorandum of Understanding between Ontario and California for collaboration on climate change action.
May 2007	California & Victoria, Australia	Memorandum of Understanding between State of Victoria and California for collaboration on climate change action.
December 2006	California & Manitoba, Canada	Memorandum of Understanding between Manitoba and California for collaboration on climate change action.
July 2006	California & United Kingdom	Climate Change Accord between the United Kingdom and California, with focus on carbon trading and promoting clean fuel technologies.
February 2006	California Air Resources Board (CARB) & European Commission	CARB hosted international Mobile Air Conditioning (MAC) representatives. Attendees agreed to harmonize MAC testing and engineering standards.

APPENDIX

California Venture Capital Investment in Cleantech

The Cleantech Group, LLC™ provided venture capital investment data in Cleantech for all disclosed deals. The Cleantech Group, LLC™ describes Cleantech as new technology and processes, spanning a range of industries that enhance efficiency, reduce or eliminate negative ecological impact, and improve the productive and responsible use of natural resources. Data were adjusted for inflation and are reported in 2007 dollars using the US city average Consumer Price Index (CPI) of all urban consumers, published by the Bureau of Labor Statistics.

Green Technology Patents

Patent data is from the US Patent & Trade Office. 1790 Analytics provided the search results for patents by green technology (solar & wind energy generation, energy storage, fuel cells, hybrid systems).

Cleantech Industry Segments

Energy Generation	
	Wind
	Solar
	Hydro/Marine
	Biofuels
	Geothermal
	Other
Energy Storage	
	Fuel Cells
	Advanced Batteries
	Hybrid Systems
Energy Infrastructure	
	Management
	Transmission
Energy Efficiency	
	Lighting
	Buildings
	Glass
	Other
Transportation	
	Vehicles
	Logistics
	Structures
	Fuels
Water & Wastewater	
	Water Treatment
	Water Conservation
	Wastewater Treatment
Air & Environment	
	Cleanup/Safety
	Emissions Control
	Monitoring/Compliance
	Trading & Offsets
Materials	
	Nano
	Bio
	Chemical
	Other
Manufacturing/Industrial	
	Advanced Packaging
	Monitoring & Control
	Smart Production
Agriculture	
	Natural Pesticides
	Land Management
	Aquaculture
Recycling & Waste	
	Recycling
	Waste Treatment

Source: Cleantech Group, LLC™

California GREEN Establishments and Employment

NETS Analysis

INDUSTRY SECTOR	ESTABLISHMENTS				
	NETS				QCEW
	GREEN ESTAB*	% SECTOR	CA TOTAL	% TOTAL CA	% TOTAL QCEW
54 Professional, Scientific, and Technical Services	**1,112**	**0.53%**	208,553	14%	9%
23 Construction	**582**	**0.51%**	113,405	7%	6%
31-33 Manufacturing	**454**	**0.50%**	90,874	6%	4%
44-45 Retail Trade	**290**	**0.14%**	204,202	13%	9%
42 Wholesale Trade	**275**	**0.31%**	89,765	6%	5%
81 Other Services (except Public Administration)	**105**	**0.06%**	177,313	12%	32%
56 Administrative and Support and Waste Management and Remediation Services	**86**	**0.08%**	110,243	7%	4%
22 Utilities	**61**	**2.81%**	2,190	0%	0%
52 Finance and Insurance	**44**	**0.06%**	80,237	5%	4%
71 Arts, Entertainment, and Recreation	**21**	**0.06%**	34,930	2%	2%
48-49 Transportation and Warehousing	**16**	**0.05%**	32,657	2%	2%
53 Real Estate and Rental and Leasing	**12**	**0.01%**	81,466	5%	4%
51 Information	**11**	**0.03%**	43,422	3%	2%
99 Unclassified	**6**	**0.01%**	2,176	0%	
62 Health Care and Social Assistance	**4**	**0.00%**	128,652	8%	7%
21 Mining	**4**	**0.25%**	1,497	0%	0%
55 Management of Companies and Enterprises	**2**	**0.12%**	1,936	0%	0%
11 Agriculture, Forestry, Fishing and Hunting			22,462	1%	2%
61 Educational Services		**0.00%**	28,207	2%	2%
72 Accommodation and Food Services		**0.00%**	61,352	4%	6%
92 Public Administration			8,960	1%	1%
	3,085	**0.20%**	**1,524,499**		

*Distribution of establishments across sectors was imputed for 1,611 establishments for which the Green Segment was known.

INDUSTRY SECTOR	EMPLOYMENT				
	NETS				QCEW
	GREEN EMP*	% SECTOR	CA TOTAL	% TOTAL CA	% TOTAL QCEW
31-33 Manufacturing	**18,086**	**1.2%**	1,505,182	12.5%	10%
54 Professional, Scientific, and Technical Services	**12,226**	**1.4%**	864,551	7.2%	6%
23 Construction	**4,476**	**0.6%**	769,593	6.4%	6%
42 Wholesale Trade	**2,935**	**0.4%**	833,756	6.9%	4%
22 Utilities	**1,796**	**2.3%**	78,073	0.6%	1%
44-45 Retail Trade	**1,139**	**0.1%**	1,617,769	13.5%	11%
56 Administrative and Support and Waste Management and Remediation Services	**1,137**	**0.2%**	495,254	4.1%	6%
81 Other Services (except Public Administration)	**641**	**0.1%**	549,256	4.6%	5%
48-49 Transportation and Warehousing	**422**	**0.1%**	490,510	4.1%	4%
52 Finance and Insurance	**346**	**0.1%**	480,048	4.0%	4%
51 Information	**220**	**0.1%**	380,536	3.2%	3%
71 Arts, Entertainment, and Recreation	**91**	**0.0%**	201,149	1.7%	2%
99 Unclassified	**88**	**0.9%**	9,760	0.1%	
53 Real Estate and Rental and Leasing	**86**	**0.0%**	299,318	2.5%	2%
55 Management of Companies and Enterprises	**31**	**0.2%**	12,545	0.1%	2%
21 Mining	**23**	**0.1%**	24,589	0.2%	0%
62 Health Care and Social Assistance	**4**	**0.0%**	997,522	8.3%	10%
11 Agriculture, Forestry, Fishing and Hunting		**0.0%**	208,833	1.7%	2%
61 Educational Services		**0.0%**	680,305	5.7%	9%
72 Accommodation and Food Services		**0.0%**	668,825	5.6%	8%
92 Public Administration		**0.0%**	849,012	7.1%	5%
	43,746	**0.4%**	**12,016,386**		

*Employment was imputed for 1,611 establishments for which the Green Segment was known.

Endnotes

[1] D. Farrell, S. Nyquist, M. Rogers. 2007. "Making the most of the world's energy resources." *The McKinsey Quarterly* McKinsey & Company (Number 1, 2007), page 29.
[2] D. Kammen, K. Kapadia, M.Fripp. 2004/2006. "Putting Renewables to Work: How Many Jobs can the Clean Energy Industry Generate?" Report of the Renewable and Appropriate Energy Laboratory. UC Berkeley. Page 12.
[3] D. Roland-Holst. 2006. "Economic Growth and Greenhouse Gas Emissions in California." UC Berkeley.
[4] J. Makower, R. Pernick, C. Wilder. 2008. *Clean Energy Trends 2008*. Clean Edge. (March 2008). http://www.cleanedge.com/reports/pdf/Trends2008.pdf
[5] S. Simonson. 2008. "Re-energizing old buildings. Old manufacturing space finds new life with Cleantech industry tenant leasing," *Silicon Valley/San Jose Business Journal*. Feb. 29, 2008. Vol.25 No.43. Page 1.
E. Ritch. 2008. "Surge in solar hiring fuels training needs." *Silicon Valley/San Jose Business Journal*. (Feb. 29, 2008) Vol.25 No.43. Page 1.
[6] According to the National Association of Home Builders, by 2010, environmentally friendly construction will account for as much as 10 percent of all housing starts, at a market value of $38 billion, which is up from 2 percent of starts, or $7.4 billion, in 2007. See Jim Carlton. 2008. "Home Builders Go 'Green' To Seek New Selling Point." *Wall Street Journal*. *(*March 5, 2008), Page B1.
[7] J. Makower, R. Pernick, C. Wilder. 2008. Page 12.
[8] The California Solar Initiative offers rebates on the installation of solar systems on residences and businesses. See, www.gosolarcalifornia.ca.gov
[9] For example, the State of California has mandated that all new passenger vehicle and light-duty trucks purchased by the State must meet or exceed the Ultra Low Emission Vehicle (ULEV) requirements as established by the California Air Resources Board (SB 1170). See, California Environmental Protection Agency. 2005. "State of California's Actions to Address Global Climate Change" California Climate Action Team Report. www.climatechange.**ca**.gov/climate_action_team/reports/2005-12-08_STATE_ACTIONS_REPORT.PDF
[10] http://cleantechnetwork.com/index.cfm?pageSRC=CleantechDefined
[11] Because of the limitations of the data, the detailed industry codes are only available for roughly half of our identified establishments.
[12] Find out more about the California Regional Economies Project (CREP) and the nine economic regions in the state at the California State Economic Strategy Panel: http://www.labor.ca.gov/panel/
[13] Based on 2006 Occupational Employment Statistics and reported in 2007 dollars.
[14] The NETS database includes 8-digit SIC codes which provide far greater detail than NAICS. With only two exceptions, the establishments with NAICS 541690 Other Scientific and Technical Consulting Services had the SIC 87489904 Energy Conservation Consultant.
[15] This is revealed in the more detailed 8-digit SIC codes in the NETS database.
[16] Find out more about the California Regional Economies Project (CREP) and the nine economic regions in the state at the California State Economic Strategy Panel: http://www.labor.ca.gov/panel/
[17] As described on page 13, narrower than green technology, Cleantech is new technology that spans a broad range of products, services and processes that lower performance costs, reduce or eliminate negative ecological impact, and improve the productive and responsible use of natural resources. (See Endnote 10.)
[18] Nathan Rosenberg. 1982. *Inside the Black Box: Technology and Economics.* Cambridge: Cambridge University Press.
[19] Gilbert Chan. 2007. "Funds stepping up on climate CalPERS, CalSTRS are teaming with 150 business leaders" in BUSINESS section, *Sacramento Bee*, (Monday, December 3, 2007), Page D1

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LABOR & WORKFORCE DEVELOPMENT AGENCY

EDD Employment Development Department State of California

California WORKFORCE INVESTMENT BOARD